NPS-AM-05-034

EXCERPT FROM THE

PROCEEDINGS

OF THE

SECOND ANNUAL ACQUISITION RESEARCH SYMPOSIUM

FROM MARKET TO CLAN: HOW ORGANIZATIONAL CONTROL AFFECTS TRUST IN DEFENSE ACQUISITION

Published: 1 May 2005

by

Roxanne Zolin and John Dillard

2nd Annual Acquisition Research Symposium of the Naval Postgraduate School:

Acquisition Research: The Foundation for Innovation

May 18-19, 2005

Prepared for: Naval Postgraduate School, Monterey, California 93943

ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
01 MAY 2005		**00-00-2005 to 00-00-2005**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
From Market to Clan: How Organizational Control Affects Trust in Defense Acquisition	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Naval Postgraduate School,Graduate School of Business and Public Policy,555 Dyer Road, Room 332,Monterey,CA,93943**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES
2nd Annual Acquisition Research Symposium: The Foundation for Innovation, May 18-19, 2005 in Monterey, CA

14. ABSTRACT
see report

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**25**	

The research presented at the symposium was supported by the Acquisition Chair of the Graduate School of Business & Public Policy at the Naval Postgraduate School.

To request Defense Acquisition Research or to become a research sponsor, please contact:

NPS Acquisition Research Program
Attn: James B. Greene, RADM, USN, (Ret)
Acquisition Chair
Graduate School of Business and Public Policy
Naval Postgraduate School
555 Dyer Road, Room 332
Monterey, CA 93943-5103
Tel: (831) 656-2092
Fax: (831) 656-2253
E-mail: jbgreene@nps.edu

Copies of the Acquisition Sponsored Research Reports may be printed from our website www.acquisitionresearch.org

Conference Website:
www.researchsymposium.org

ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL

Proceedings of the Annual Acquisition Research Program

The following article is taken as an excerpt from the proceedings of the annual Acquisition Research Program. This annual event showcases the research projects funded through the Acquisition Research Program at the Graduate School of Business and Public Policy at the Naval Postgraduate School. Featuring keynote speakers, plenary panels, multiple panel sessions, a student research poster show and social events, the Annual Acquisition Research Symposium offers a candid environment where high-ranking Department of Defense (DoD) officials, industry officials, accomplished faculty and military students are encouraged to collaborate on finding applicable solutions to the challenges facing acquisition policies and processes within the DoD today. By jointly and publicly questioning the norms of industry and academia, the resulting research benefits from myriad perspectives and collaborations which can identify better solutions and practices in acquisition, contract, financial, logistics and program management.

For further information regarding the Acquisition Research Program, electronic copies of additional research, or to learn more about becoming a sponsor, please visit our program website at:

www.acquistionresearch.org

For further information on or to register for the next Acquisition Research Symposium during the third week of May, please visit our conference website at:

www.researchsymposium.org

THIS PAGE INTENTIONALLY LEFT BLANK

From Market to Clan: How Organizational Control Affects Trust in Defense Acquisition

Presenter: Roxanne Zolin, is an Assistant Professor in the Graduate School of Business and Public Policy at the Naval Postgraduate School. Roxanne is currently working on research projects for NAVAIR's SBIR and AirSpeed, NPS' Homeland Security Digital Library, and the International Military Education and Training organization. She has a PhD in Engineering Management and a Master's Degree in Sociology from Stanford University, an MBA from Monash University, Melbourne, and a Bachelor of Business (Management) from Queensland Institute of Technology, Australia. Roxanne has operated her own businesses in Software Development and Enterprise development, helping start over 500 new businesses. Previously Roxanne was Marketing Manager for various organizations, such as Meyer's Stores, the world's 15th largest department store chain. Her promotions won awards from the Sales Promotion Association of Australia.

Dr. Roxanne Zolin
Assistant Professor of Management and Information Systems
Graduate School of Business and Public Policy
Naval Postgraduate School
Monterey, CA 93943-5197
Phone: (831) 656-2644
Fax: (831) 656-3407
E-mail: rvzolin@nps.edu

Presenter: John Dillard, joined the NPS faculty in the fall of 2000 with extensive experience in the field of systems acquisition management. His research focuses on defense acquisition policy changes and their implications. John began his career in program and contract management after attaining a MS in Systems Management from the University of Southern California in 1985. He has been involved with myriad technologies and system concepts that have evolved into fielded products, such as the M-4 Carbine, 120mm Mortar, and M-24 Sniper Weapon. He was the Assistant Project Manager for Development of both the Army Tactical Missile System and, later, the JAVELIN Antitank Weapon System at Redstone Arsenal, Alabama. All of these systems incorporate state-of-the-art technologies, are in sustained production and fielding, and are now battle-proven. He was the Product Manager for the Joint Advanced Special Operations Radio System, and in 1998 was appointed to head Defense Department contract administration in the New York metropolitan area. John has consulted for the governments of Mexico and the Czech Republic on achieving excellence in the public sector. As an adjunct professor for the University of California at Santa Cruz, he teaches courses in project management and leadership to Silicon Valley public- and private-industry professionals.

John Dillard
Senior Lecturer
Naval Postgraduate School
Monterey, CA 93943-5197
Phone: (831) 656-2650
Fax: (831) 656-3407
E-mail: jdillard@nps.edu

Abstract

Military acquisition relies upon industry for new product development, but market organizational control is not recommended for knowledge-intensive work. Unfortunately, increasing hierarchy-control mechanisms, such as formalization, could reduce trust. What is the appropriate balance of control mechanisms and trust for an IPT in the DoD acquisition realm? We conducted interviews and surveys in a major military acquisition program office employing IPTs, Alpha Contracting and collocation. We found that the relationship between formalization and trust was different between government and contractor team members. Acquisition managers must understand the relationships between control mechanisms and trust within and between organizations to increase collaboration between government and contract personnel.

Key words: Trust, Organizational control, Transaction-cost Economics

Introduction

The government and industry partnership is central in the military acquisition domain—with both parties pursuing both common and separate goals based upon their buyer and seller roles. Organizational control theory holds that in such environments of differing goals, managers can use three types of control systems: the market, the bureaucratic, and the clan (Ouchi, 1980). In *market organizational control systems,* managers contract with and then monitor their suppliers. In *bureaucratic (hierarchical) organizational control systems,* formal control mechanisms (such as rules and regulations) are enforced through hierarchies. Workers within *clan organizational control systems* self-manage using common values, traditions and beliefs. Acquisition of new weapon systems has traditionally employed the *market* form of organizational control with the industry side of the partnership, and *bureaucratic* organizational control within the Department of Defense (DoD).

Given the nature of new product development, DoD Program Management Offices typically operate in the context of relatively high asset specificity, risk aversion and uncertainty. Although these variables have been shown by research to encourage the switchover from *market* to *hierarchy* control, the government/industry buyer/seller relationship precludes the adoption of hierarchical organizational control or even quasi-vertical integration.

However, over the last 10 years, defense acquisition has adopted Integrated Product and Process Development (IPPD), using Integrated Product Teams (IPT) to encourage government and contractor personnel to work more closely together to design and build new products (OUSD, 1998). IPTs, Alpha Contracting, management councils and other organization-oriented changes (such as collocation of government and contractor personnel) have extended the *market* form of organizational control; yet, each of these must stop short of switching over to the *hierarchical* or *bureaucratic* organizational control form given the separation of public and private enterprise.

The government's goal orientation in its procurement pursuits is provided in the guiding principles of FAR Part 1.102:

The Federal Acquisition System will—(1) Satisfy the customer in terms of cost, quality, and timeliness of the delivered product or service by, for example—(i) Maximizing the use of commercial products and services; (ii) Using contractors who have a track record of successful past performance or who demonstrate a current superior ability to perform; and (iii) Promoting

competition; (2) Minimize administrative operating costs; (3) Conduct business with integrity, fairness, and openness; and (4) Fulfill public policy objectives. (FAR, 2004)

In short, the government seeks the best possible value of goods and services for the least cost to the taxpayer, while industry seeks to maximize profit while avoiding competition. Fundamental goal differences notwithstanding, this partnership has historically yielded unmatched military capability, as well as profit for shareholders.

Trust has also been recognized as a critical ingredient in modern defense acquisition (Siemsen, 2002). Although *trust* is considered to be the basis of the *clan* form of organizational control, scholars recently have observed that *trust* can be used to extend *market* control and to avoid switching over to *hierarchical* control.

This research study asks: What is the appropriate balance of hierarchy-control mechanisms and trust for an IPT in the DoD acquisition realm*?*

In this paper we describe the changes in work structure in major military acquisition programs employing the IPPD and Alpha Contracting approaches. We analyze the risks for client and supplier representatives in new product development teamwork and develop hypotheses about the effect of control mechanisms—such as formalization—on interpersonal trust. We conducted eighteen interviews and a survey in a major weapon system program office employing IPTs, Alpha Contracting and collocation to test our hypotheses. We analyze and report the results and describe the implications for managers of IPTs.

THE EVOLVING GOVERNMENT/INDUSTRY RELATIONSHIP

New product development is increasingly undertaken in the context of inter-firm collaboration, in which a client firm engages an outside supplier to design and/or engineer a component, subsystem or process (Carson, Madhok, Vasrman & John, 2003). Likewise, in defense acquisition the government engages industry suppliers with contracts to develop their new products. Because the US government is often the sole purchaser of newly developed weapon systems, something of a monopsony exists in which the supplier cannot sell the product to another purchaser without the government's consent. Similarly, once the government selects a single supplier to develop a new technology, the supplier gains a competitive advantage over other suppliers, creating a monopoly supply situation for follow-on procurement contracts. Therefore, the power of buyer and seller are somewhat balanced in a situation in which asset specificity develops and partners change to entail extremely high transaction costs. In such a situation, exit costs are high for both parties: the cost to the government of nonperformance by the contractor is high, and the cost to the contractor of finding another partner is very high as well.

Alpha Contracting

The government's traditional contracting approach (before acquisition reforms of the last decade) required successive iterations between the client and the supplier—to discover the client's requirements and the applicable supplier technologies—until a relatively complete contract could be written. This traditional sequential interdependency relationship has changed to a closer reciprocal interdependency relationship with Alpha Contracting, in which the client and supplier work together to define the requirements and discover solutions. Again, the Federal Acquisition Regulation gives guidelines for this dialogue:

> The Government must not hesitate to communicate with the commercial sector as early as possible in the acquisition cycle to help the Government determine the capabilities available in the commercial marketplace. The Government will maximize its use of commercial products and services in meeting Government requirements. (FAR Part 1.102-2)

Alpha Contracting has evolved from a 1990s-era reform initiative aimed at improving government and contractor communications in order to increase efficiency and effectiveness. At its very foundation is a need for increased trust and teaming toward common government/industry objectives, within the paradigm of their buyer/seller relationship. By encouraging more collaboration early in the contracting negotiations phase, Alpha Contracting reduces procurement costs and cycle time via joint and concurrent processes and information flows. Key activities in the process are: specification of requirements, preparation of the statement of work, negotiations and executive review. Even though direct savings may be hard to quantify, most agree the savings derived from Alpha Contracting are substantial, even if the only savings counted is the increase in the program office staff's time free to solve other problems (Nissen, 1997). As Siemsen (2002) explained, the indirect benefits extend to both government and contractor as monitoring costs of other agencies like Defense Contract Audit Agency (DCAA) and Defense Contract Management Agency (DCMA) are precluded. This initiative actually seeks and obtains the information that enables a trust-based partnership. The shift from sequential to concurrent requirements definition and design is happening in many industries, not only the DoD. For example, the construction industry has adopted the design/build approach.

In addition to collaborating on the requirements definition and contracting phase of new product development, the interpersonal closeness developed in the Alpha Contracting approach can be carried over to the development stage. The use of Integrated Product Teams (IPT) encourages the government's user representatives and the contracting supplier's engineers to work together as the new product is designed and the initial prototypes are built. In some instances, the government's representatives and the contractor's engineers are collocated in the same building. The potential advantages of this increasingly close interdependency between client and supplier are to shorten the design process, reduce development costs and, hopefully, to increase the quality of the resulting product. These advantages mainly apply to the government, but the advantage to the contractor in such closer interaction might be a perceived increase in the likelihood of winning a future competitive bid. The potential disadvantages of this trend towards more concurrent engineering include the difficulties of achieving higher interdependencies between everyone involved in the project, including the government representatives and the contractor's engineers, designers and developers.

ORGANIZATIONAL CONTROL MECHANISMS: MARKET, HIERARCHY AND CLAN

Transaction-cost economics proposes that when the specific identity of the parties has an important cost-bearing significance, the transaction becomes idiosyncratic, rather than unspecialized (Williamson, 1979). Cost economies in production occur if the supplier develops a special-purpose plant or the labor force develops special-purpose skills in the course of contract execution. Special-purpose skills, which can reduce transaction costs, include institutional and personal trust.

Although both buyer and supplier have long-term interests in implementing changes through a strategy of joint-profit maximizing (meaning value to each partner), each also has an interest in appropriating as much of the gain as possible (Williamson, 1979). Productivity benefits can result in excessive haggling, which could dissipate the benefit of the changes to

both parties. Alternatively, those changes could go unrealized for fear of initiating an expensive conflict. The government buyer has to trust the contractor supplier will take advantage of all potential productivity-improvement opportunities. The contractor supplier has to trust the government client will share the benefits from productivity improvements fairly.

Ouchi proposes three fundamentally different forms of organizational control for dealing with the problem of obtaining cooperation among individuals or collectives—like government buyers and contracting suppliers—who share only partially congruent objectives. These are market organizational control, hierarchy organizational control and clan organizational control (1979).

Market Organizational Control and Price

Market organizational control is based upon price (Adler, 2001), which can be a very efficient control mechanism, but the conditions for an efficient market do not always exist. In new product development, exactly how long it will take to develop a new technology or how much it will cost is difficult to predict; these unknowns make writing a fixed-price contract impractical. In the uncertain conditions provided within research and development (R&D), the government has adopted the practice of awarding cost-reimbursable contracts. This means that suppliers won't compete on price alone, but on more intangible aspects, such as their demonstrated skills, abilities and facilities; this increased range of competition reduces the strength of the market form of organizational control. In new product development, the client wants the supplier to develop extensive knowledge about the technology and users—making market-organizational control less attractive. Notwithstanding the U.S. government's sovereign right to terminate contracts for cause or convenience, the government's ability to wield market organizational control can become limited over time by the difficulty of exiting the relationship to buy from another supplier due to the asset specificity the new supplier has developed. Switching suppliers will incur huge costs and considerable time due to getting a new supplier "up to speed" on the new technology.

Hierarchy Control and Authority

When asset specificity and governance costs are high, hierarchical organizational control, based upon the exercise of authority (Adler, 2001), has advantages over market control (Chiles & McMakin, 1996). Hierarchical organizational control involves control mechanisms largely based upon formalization, which is establishing rules and monitoring behavior to ensure compliance with the rules. Unfortunately, formalization has a large administrative overhead in writing and enforcing rules. Also, in new product development, writing rules that cover all conditions when the transformation process is unknown is difficult; likewise, in knowledge work such as R&D, monitoring adherence to rules is difficult.

Clan Organizational Control and Trust

Ouchi suggests people must be able to either trust each other (i.e. have congruent goals) or to monitor performance (1979). Since monitoring performance is difficult in new product development, the situation calls for the clan form of control, which is based upon trust (Adler, 2001). Clan control relies on a "deep level of common agreement between members on what constitutes proper behavior, and it requires a high level of commitment on the part of each individual to those socially prescribed behaviors" (Ouchi, 1979). IPTs, Alpha Contracting and collocation can be seen as a move away from market and hierarchical control in the direction of clan form of organizational control. In order for clan control to be effective, the organization

must have or develop an appropriate organizational culture involving higher levels of trust. Unfortunately, many managerial strategies fail due to incompatibility with the organizational culture (Schneider, 2000).

PRICE, AUTHORITY AND TRUST IN NEW PRODUCT DEVELOPMENT

Military acquisition of new products involves all three organizational control systems described by Ouchi (1979). The formal relationship between the government and the contractor is a market-based control mechanism using contracts and market power. Once the contractual relationship is established, an IPT organization is set up and the government implements formal control mechanisms. When the work starts, informal social mechanisms develop. Through the life of the project, at different levels of organization (from the top level of contact between the government and contractor, through the IPT structure to the individual team members), the three forms of organizational control operate in various combinations (Ouchi, 1979).

Several studies have looked at the conditions under which each control mechanism will be used. Some researchers propose that most organizations use some combination of all three control mechanisms of price, authority and trust (Bradach & Eccles, 1989; Adler, 2001). Adler proposes that, particularly for knowledge-based assets which form the basis for new product development, price and authority are relatively ineffective control mechanisms compared to trust.

Gunnarson and Levitt propose that when the reduction in production savings achieved through economies of scale in outsourcing is less than the increases in transaction costs due to asset specificity, the firm will switchover from market to hierarchy control (1982). New product development has two out of three of the sources of asset specificity found in idiosyncratic transactions, including technology specificity and knowledge specificity, but not typically location specificity. With high asset specificity and low economies of scale, the product development organization is likely to switchover from a market to hierarchy form of organizational control. Zaheer and Venkatraman (1995) found that asset specificity is positively and significantly related to greater degrees of quasi-integration. This means that new product development is more likely to be vertically integrated than other activities.

The US military predominately out-sources its research and development of new weapon systems; thus, it does not have complete hierarchical control over its selected industry providers. Zaheer and Venkatraman (1995) found that trust was positively and significantly related to greater degrees of quasi-integration. This means that the closer the organization was to a hierarchy, the more trust developed. But Chiles and McMackin propose that when there are higher levels of trust, the switchover from market to hierarchy will occur later (1996). Therefore, the effects of trust can be to extend the range of market control and delay the switchover from market to hierarchy.

This study asks: when the client organization extends the range of the market form of organizational control in new product development, what effect will this have on interpersonal trust between IPT members?

Trust in New Product Development

In this research, trust is defined as the trustor's willingness to accept the risk of relying on a trustee, even when the trustor is unable to monitor or control the trustee (Rousseau, Sitkin, Burt & Camerer, 1998; see also Mayer, Davis & Schoorman, 1995). In the trust equation

(Hardin, 2000), "Person A trusts Person B about X," which is the object of trust. Zolin and Hinds (2004) extended the equation to say "when Z," where Z is the context of trust.

Trust is considered to be essential to cooperation (Kollock, 1994) and expected to have an impact on performance (Dirks, 1999), particularly in knowledge-intensive work (Lane, 1998) such as new product development.

Trust is highly influenced by the perceived trustworthiness of the trustee, the context (Rousseau, Sitkin & Camerer, 1998; McEvily, Perrrone & Zaheer, 2003, Zolin, Hinds, Fruchter & Levitt, 2004) and the history of the relationship. Perceived trustworthiness is the trustor's assessment of the trustee. This multidimensional construct is proposed to contain the dimensions of ability, benevolence and integrity. Ability reflects the trustee's skills and resources required for the necessary performance. Benevolence represents the extent that two parties share the same objectives; the trustor can trust the trustee to make decisions and act as the trustor would in the situation. Hardin calls this "encapsulated interests" (1998). Integrity is the trustee's honesty in not misrepresenting the situation.

There are many dynamics involving risk (vulnerability) and trust from the organizational to the interpersonal levels within the Program Management Office in the IPT structure. As mentioned before, the two parent organizations may have different economic objectives, but they agree to work together to achieve the project goals of designing and developing the desired product within time, cost and quality constraints.

Individual team members also have different objectives depending upon their role in the design process. For example, a design engineer could have different (and sometimes conflicting) objectives from the government's user representative. In the ITP, the government personnel represent the user and have extensive knowledge of how the product will be used in the field or what the logistical or maintenance issues will be. The government representative's function is to give the contractor engineer advice on how to design the component to maximize the value to the user. The engineer's job is to solve the engineering problems involved in the design of a new component or in integration of the new component into the system. To do so, the engineer has to understand the many constraints imposed by the function of the component and its interaction with other components in the system. The government representative's suggestions could remove some constraints, making the component easier to design. Or he/she could add new requirements, making the component more difficult to design. The engineer has to trust the government representative in order to accept the advice. If the government representative is wrong, the contractor's engineer could have to do a lot of additional work redesigning or reintegrating the component. Therefore, the engineer must trust that the government's representative knows the user's requirements (ability), has concern for the engineer's work, won't change the requirements without good reason (benevolence) and will be honest about what happens (integrity). Similarly, the government representative has to trust the engineer to listen to the advice, to accept or reject the advice based upon a sound knowledge of the constraints (ability), to not take the easy way out to reduce work (benevolence) and to be honest about the situation (integrity).

Risk, Trust and Control Mechanisms

Trust is only relevant when there is risk in the relationship. In addition to the usual risks of collaborative work—such as the free rider problem, in which an individual shirks his or her duties knowing that others in the group will perform them (Hardin, 1971)—new product

development entails additional uncertainty regarding the ability of the design engineers to develop the new product to the client's specifications within the scheduled time and budget.

Trust and control mechanisms are strategies for dealing with the freedom of the other party to take actions that may disadvantage the trustor. Because the trustee has freedom to act, the trustor wants to reduce the amount of risk he/she is exposed to. While a trustor may use control mechanisms, such as formalization of contracts, to limit the size of risk or the likelihood or failure by the trustee, ultimately collaboration requires some risk and, consequently, requires some trust.

Das and Teng propose that trust and control mechanisms work as supplements, rather than alternatives, to create cooperation and reduce opportunistic behavior in inter-firm alliances (1998). Leifer & Mills define control as a "regulatory process by which the elements of a system are made more predictive through the establishment of standards in the pursuit of some desired objective or state" (1996, p. 117). Das and Teng also use the concept of control mechanisms, which are organizational arrangements designed to determine and influence what organization members will do. If trust and control mechanisms are supplementary, they will have a positive relationship, such that the more control mechanisms there are, the more trust will develop.

Alternatively, some theorists propose that trust and control are complimentary. In other words: the more trust there is, the less control mechanisms are needed, or the more control mechanisms are used, the less trust develops. Sitkin and Roth propose that legalistic remedies—i.e., "mechanisms that are institutionalized, mimic legal forms, and exceed legal regulatory requirements" (1993, p. 367)—will fail to restore trust and could lead to an "inflationary spiral" of increasingly formalized relations. They distinguish between trust based upon ability and distrust based upon generalized value incongruence. They propose that legalistic mechanisms are more effective in addressing reliability issues than value incongruence. Researchers have found that highly formalized management-control systems lead to escalating distrust when they are mismatched to the task at hand, such as the use of precise and deterministic measurement and monitoring in conditions characterized by high levels of uncertainty (Sitkin & Stickle, 1996).

Organizational boundaries could influence the relationship between trust and control. Dyads operating within the same organization could have a supplementary relationship between trust and control because controls provide protection and reduce the risk needed for trust. In contrast, when dyads operate across organizational boundaries, there could be more value incongruence. We propose that dyads operating across organizational boundaries will have a negative relationship between trust and control mechanisms, while those operating within the same organization will have a positive relationship.

Hypothesis 1: When the trustor and trustee belong to the same organization, there will be a positive relationship between control mechanisms such as formalization and trust.

Hypothesis 2: When the trustor and trustee belong to different organizations, there will be a negative relationship between control mechanisms such as formalization and trust.

METHODOLOGY

This research project studied a target population composed of all twenty-eight IPT teams in an Acquisition Category (ACAT) 1D major defense acquisition development program. Those IPT teams contained 368 members consisting of government, civilian, military and contractor

employees. The research consisted of two elements: qualitative interviews and a quantitative survey.

Eighteen semi-structured interviews were conducted onsite with 12 government personnel and 6 contractor personnel. Interviews were voluntary and individuals self-selected to be interviewed. The growing size of the project IPT was mentioned by the Project Manager prior to the study as a potential problem. Questions were asked about collocation, team size and Alpha Contracting, but respondents were also encouraged to raise their own issues and discuss what problems and solutions they perceived.

Team members were asked to complete an online survey. A non-probability convenience sampling method was used. Team members were invited to respond on a voluntary basis.

Respondents were asked to answer questions about their demographics as well as questions about their relationship with the trustee. The respondents were asked to provide information on their work relationship with four other employees chosen at random. This design created pairs of trustor (respondent)/trustee called "directional dyads." The directional dyad is the unit of analysis. The sample size was 370 directional dyads.

Except for questions about the frequency of communication, all variables were measured using a 7-point Likert scale from "Strongly disagree" (1 point) to "Strongly agree" (7 points). Where a question was reversed in the meaning from the overall direction of other questions, the result for that question was reversed (i.e., a 1 was converted to a 7).

Trust ($\alpha = .72$) and perceived trustworthiness ($\alpha = .96$) were measured using scales developed by Mayer and Davis (1999). Zolin, Fruchter, Hinds and Leavitt (2004) proposed the questions for risk and reward, and a scale for perceived follow-through ($\alpha = .88$). Formalism ($\alpha = .80$) was measured on a scale developed by Hanks and Chandler (1995). Project communication, coordination communication and personal communication were measured by the number of times the topic was discussed per week.

Analysis

For the 370 directional dyads, t-tests for differences in means for government versus contractor personnel were conducted. To test for interrelationships between the variables, we computed Pearson correlation coefficients with respective p-values. Linear regression was used to model the relationship between the trust as the dependent variable and the various independent variables.

QUALITATIVE RESULTS

Collocation, Alpha Contracting and Team Size

Most individuals interviewed reported being collocated with their team members. The general consensus was that collocation was better, making communication easier. The positive attitude towards collocation was shared by both government and contractor personnel, but the government personnel appeared to appreciate collocation more. Government personnel reported that before collocation they had to make formal appointments to meet with contractors, journey from one building to the other (several miles) and waste the trip if the other party became unavailable. Collocation provided the opportunity to meet informally.

The few individuals whose teams were divided between two buildings reported that geographic distribution made communication difficult and slowed the process. Sometimes, although the team was collocated, the respondent had to work with other teams that were geographically distant, which caused problems. For example, a contract team member reported that difficulties arose from not being close to the Configuration Management team. Geographic separation was reported to increase "stove piping," although even those who were collocated reported this issue.

Alpha Contracting was positively received, although some contractor personnel were not familiar with the term. Alpha Contracting was mainly associated with collocation of government and contractor personnel.

Although several respondents mentioned they had never worked in such a large project team, the overall size of the project was not mentioned as a problem. A problem which was mentioned more than once was the ineffectiveness of large meetings (described as consisting of 30 to 80-plus people). The difficulty of making decisions in such a large meeting was mentioned by four government personnel.

Another problem related to team size was the difficulty created by team growth. The addition of new team members was reported to slow things down because each addition had to be briefed on what was happening.

Problems and solutions

The onsite interviews had a higher response rate from government (11) than contractor (6) personnel. As would be expected, the individuals who volunteered to be interviewed had strong opinions (usually negative) about the project. Only one respondent mentioned no problems. Respondents mentioned many of the problems that IPTs and Alpha Contracting are designed to overcome, including lack of communication, stove piping, and lack of integration. Problems mentioned included:

1. Stove piping, conflict, personalities, career-agenda people
2. Disrespect for top management
3. Lack of communication, coordination, cooperation
4. Schedule-driven, overly ambitious schedule
5. Micro-management
6. Lack of integration
7. Lack of discipline, lack of control and lack of strong leadership
8. Large meetings
9. Lack of training

Complaints were more often directed toward the system than individuals. Government and contractor personnel were just as likely to criticize their own organization's performance as that of the other organization. Despite this, there was a general feeling of frustration by government personnel who felt they had no control and no way to make the contractors heed their advice, despite sometimes feeling like they had superior training and experience to that of

the contractors. Some contractor personnel also felt the government should take more control of the situation and give more direction.

Many respondents complained about the IPT team structure. There appeared to be two groups: those who preferred the "traditional" structure in which the "government told the contractors what to do" and those who preferred the IPT approach, but thought it wasn't being followed. The Traditionalists were the larger group and represented both government and contractor personnel. Typical complaints by the Traditionalists were lack of discipline, lack of control and lack of strong leadership. Typical complaints by the IPT supporters were lack of adequate training. One government IPT supporter said:

> There is no such thing as a Government IPT. The Government IPT was created by those who refuse to break with tradition. Folks in a Government IPT do their own thing and then talk to the contractor when they've made up their minds. In a real IPT, the government is a representative, not a lead. -Government representative

The difficulty of integration was mentioned by both government and contractor personnel. Integration includes the need for coordination of design changes across the IPT. One Contractor mentioned, "people don't want to make changes, it takes more work."

Many of the individuals who volunteered for interviews belong to IPTs that have to integrate across the existing IPT structure; for example, some teams were described as Interface IPTs creating components (such as cabling) to connect system parts. If a part changes, the cables connecting to it have to change. Besides being made to work extra if a part changes, these individuals are not always told when something upstream changes. Two IPTs were created by the government to represent the two prototypes under construction and to integrate across the functional IPTS; yet, these two government IPTs weren't reflected in the contractor structure at the time of the interviews.

QUANTITATIVE RESULTS

The descriptive statistics are reported in Table 1, which shows the means, standard deviations and F-statistic for the comparison of government and contractor personnel (See Table 1). Both government and contractor trustors had high levels of trust, between which there was no significant difference (F-statistic = 2.19, n.s.). When we distinguish dyads by both trustor and trustee (e.g., government trustor and government trustee—G to G), the dyad type with the highest trust was government to contractor. The lowest was contractor to government.

Government trustors reported significantly higher levels of project communication (F-statistic = 13.87, $P < .001$), coordination communication (F-statistic = 7.40, $P < .01$), and perceived follow-through (F-statistic = 6.46, $p < .05$) than contractors.

Table 1. Descriptive Statistics

	All		Government		Contractor			Gov to Gov	Gov to Con	Con to Con	Con to Gov
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	F-statistic	Mean	Mean	Mean	Mean
1. Trust	4.97	1.36	5.21	1.34	4.92	1.35	2.19	5.2	5.3	5.0	4.6
2. Trust propensity	3.81	0.80	3.71	0.52	3.84	.84	1.51	3.6	3.9	3.8	3.9
3. Formalization	4.26	1.07	4.70	0.87	4.15	1.07	15.39***	4.6	4.8	4.0	4.7
4. Risk	3.96	1.17	3.79	1.08	3.99	1.17	1.51	3.9	3.6	3.9	4.3
5. Reward	5.77	1.04	5.38	0.93	5.86	1.04	11.72***	5.3	5.5	5.8	5.9
6. Project comms.	4.39	5.62	6.85	8.37	3.76	4.44	13.87***	7.8	5.2	4.1	2.1
7. Coordination comms.	3.11	4.10	4.46	4.92	2.68	3.72	7.40**	5.2	3.2	2.8	2.0
8. Personal comms.	2.27	2.58	2.81	2.79	2.11	2.52	2.69	3.4	1.6	2.2	1.6
9. Hours F2F	4.50	6.74	5.38	5.79	4.32	6.97	1.37	5.5	5.2	4.8	2.6
10. Perceived trustworthiness	5.60	1.17	5.77	1.05	5.57	1.19	1.56	5.7	5.9	5.6	5.3
11. Perceived follow-through	5.43	1.29	5.81	1.18	5.35	1.30	6.46*	5.9	5.7	5.4	5.2

*** p<.001, ** p<.01, * p<.05, + p<.10

Correlations between variables are reported in Table 2. Trust was significantly related to formalization (r = .14, p< .05) and personal communications (r= .17, p< .05), but there was no significant relationship to risk (r=-.08, n.s.) or reward (r= -.04, n.s.).

Table 2. Correlations

	1	2	3	4	5	6	7	8	9
1. Trust									
2. Formalization	.14*								
3. Risk	-.08	-.23***							
4. Reward	-.04	.12*	.18***						
5. Project comms.	.18**	-.05	.05	-.09					
6. Coordination comms.	.14*	.02	-.05	.01	.75***				
7. Personal comms.	.17*	.00	.01	-.18	.64***	.56***			
8. Hours F2F	.24***	.00	.03	-.16**	.42***	.31***	.44***		
9. Perceived trustworthiness	.80***	.13*	-.06	-.04	.12+	.07	.17*	.24***	
10. Perceived follow-through	.60***	.05	.05	-.06	.17**	.08	.22**	.30***	.68***

*** p<.001, ** p<.01, * p<.05, + p<.10

Hypothesis 1 proposed that when the trustor and trustee belong to the same organization there will be a positive relationship between trust and formalization. Both government and contractor trustors had high levels of trust, between which there was no significant difference (F-statistic = 2.19, n.s.) (See Table 1). When we distinguish dyads by both trustor and trustee (e.g., government trustor and government trustee—G to G), the dyads with

the highest trust were government to contractor (M = 5.3) and government to government (M = 5.2). The lowest was contractor to government (4.6). Government trustors reported significantly higher levels of formalization (F-statistic = 15.39, p< .001) than contractor trustors.

To test the hypothesis, we conducted regression models for each of the different dyad types (see Table 3). In model 2, there was a significant positive relationship between formalization and trust among government trustors and government trustees (β = .31, p< .05). Yet, no significant relationship existed for contractor-to-contractor dyads (β = -.06, n.s.). This data provides partial support for hypothesis 1.

Hypothesis 2 proposed that in dyads when trustor and trustee belong to the different organizations there will be a negative relationship between trust and formalization. In model 2, there was a negative relationship between formalization and trust in government-to-contractor dyads (β = -1.02, p< .01) and a barely significant negative relationship for contractor–to-government dyads (β = -.36, p< .10). This data supports hypothesis 2.

Table 3. Comparison of OLS Estimates (Standardized beta Values) of Trust

	Gov to Gov		Gov to Con		Con to Con		Con to Gov	
	M1	M2	M1	M2	M1	M2	M1	M2.
Intercept	+		***		***			
Formalization	.44*	.31*	-1.02**	-.69	.05	-.06	-.13	-.36+
Risk	-.61*	-.08	.45+	.46	-.02	-.29***	-.36	-.57*
Reward	.14	-.06	.17	.14	.02	.32***	.52+	.07
Project communication	-.14	-.01	.14	-.06	.11	-.00	.11	.83+
Coordination communication	-.56	-.15	.19	.23	.00	.06	.05	-.36
Personal communication	.87**	.38*	.20	.20	.07	-.04	.41	-.47
Perceived trustworthiness		.71***		.35		.56***		.72**
Perceived follow-through		.04		.70		.35***		.40+
Adj. R-squared	.37	.71	0.71	0.71	-.02	.63	-.09	0.73
Model F	3.60*	13.11***	5.82*	4.44	0.65	22.78***	0.77	6.73**
Degrees of freedom	6, 21	8, 19	6, 6	8, 3	6, 109	8, 93	6, 11	8, 9

*** p < .001, ** p < .01, * p < .05, + p < .10 (C = Contractor, G = Government)

DISCUSSION

Our results support our theories, which propose there is a positive relationship between trust and formalization in dyads within organizations, but a negative relationship between trust and formalization in dyads that span organizational boundaries.

Likewise, market control mechanisms operating at the firm level may be ineffective in regulating behavior at the interpersonal level.

In our qualitative results, both the government and contractors asked for more controls, although the level of formalization in both organizations was moderate, with government personnel rating formalization slightly higher than the contractors (Government 4.7 and Contractor 4.15 out of 7).

In our quantitative results, formalization increased trust for government trustors, but was not significant for contractors. In contrast, contractors' trust was associated with lower risks and higher rewards. These differences between government and contractor organizations could indicate differences in organizational context or organizational culture. More research is needed to determine the source of this difference.

The relationships between trust and formalization that applied within the government and contractor organizations did not apply across organizational boundaries. Although formalization increased trust of Government trustors for government trustees, formalization was negatively related to trust when the trustee was a contractor. Similarly, although trust was not significant for contractors within their organization, contractor trustors also had a negative relationship between formalization and trust when the trustee was a government representative. This confirms that there is a negative relationship between formalization and trust when the dyad spans organizational boundaries.

Given the market relationship between the government and contracting organizations, it is possible that their formal rules only applied within each organization, and that there were few, if any, rules that applied across organizations. For example, the government's rules applied to government personnel; yet, those same rules might not apply to the contractor's personnel. Similarly, the contractor's rules may not apply to government personnel.

When the organizational control is a market relationship at the organizational level; highly interdependent work seems to be difficult at the interpersonal level. In this context, we found individuals experienced difficulties which they felt could be alleviated by greater hierarchical control.

Although trust can be an alternative to hierarchical control, that trust must be built through shared norms and values; these may not exist between different organizations such as government and contractors.

Implications for Managers

This research does not question the basis for the government's decision to rely upon industry for its research and development; there are obviously good and enduring reasons for that policy. Given that the government and an increasing number of other organizations manage R&D through the market form of organizational control, what more can be done to facilitate the development of quality products developed within time and budget constraints?

1. Foremost in such contractual relationships is the realization on the part of organizational leaders that a substantial structural difference exists, especially in the case of government-industry (buyer/seller) partnerships. These structural differences create different risks and rewards for team members representing buyer-organizations compared to seller organizations.

2. Equally important is the need to develop trust without relying upon formalization, because formal rules could reduce trust. Alternative trust-building methods should be used, such as emphasizing shared goals and values by top management and enculturation of new team members.
3. Managers of outsourced new product development should be aware of the symbolic impact of their actions and consider how those actions will be interpreted by both buyer and seller representatives.
4. The client and contractor organizations should consider how inter-organizational rules could be instituted in ways that would facilitate, rather than erode, trust. For example, Positive Organizational Change initiatives (such as Appreciative Inquiry) could identify changes in ways that avoid the downward spiral of formalization. Likewise, an innovative approach toward trans-organizational individual (not just enterprise) rewards might be considered for improved motivation.
5. Program Managers should consider what teambuilding activities can be used to facilitate the development of trust and collective identity. Although the government has rules against the provision of benefits such as food and entertainment, opportunities may be created for government and contractor personnel to interact in social contexts.
6. Program Managers should bring the risks associated with lack of trust into explicit and conscious awareness. They can ensure the government personnel understand the problems they can cause by suggesting changes which would be overruled at a later date. They can also ensure the contractor engineers understand the loss they can create by ignoring valid suggestions from government personnel.
7. Program Managers should ensure team members understand their roles. Of particular importance is that the government representative understands the facilitation role—as opposed to a line-management role. Likewise, members of interfacing teams should be trained to understand project interdependencies and how to achieve component integration.
8. Finally, management should measure achievement in areas highly influenced by trust, such as government-to-contractor knowledge transfer and system integration.

This study was limited by the small number of respondents. Division of the dyads by both trustor and trustee yielded very small samples, but some statistically significant results were obtained. Our study is also a snapshot of the situation at a point in time, while trust is dynamic and varies over time. Therefore, we could learn more with a longitudinal study.

CONCLUSION

Trust is proposed as a way to extend market control of R&D and new product development.

We found that team members representing buyers had different relationships between control mechanisms, such as formalization and trust, than those representing sellers. Within their organizations, buyer's representatives had a positive relationship between formalization and trust, but that relationship did not exist for the seller's representatives. When representatives operated across organizational boundaries, the relationship between

formalization and trust was negative, indicating that greater formalization could lead to less trust.

We encourage managers of outsourced new-product development to be aware of differences in trust and control between buyer and seller representatives in such teams.

REFERENCES

Adler, P. S. (2001). Market, hierarchy and trust: The knowledge economy and the future of capitalism. *Organization Science,* 12(2), 215-34.

Becerra, M., & Gupta, A.K. (2003). Perceived trustworthiness within the organization: The moderating impact of communication frequency on trustor and trustee effects. *Organization Science,* 14, 32-44.

Bradach, J. L., & Eccles, R. G. (1989). Price, authority, and trust: From ideal types to plural forms. *Annual Review of Sociology,* 15, 97-118.

Carson, S.J., Madhok, A., Varman, R. & John, G. (2003). Information processing: Moderators of the effectiveness of trust-based governance in interfirm R&D collaboration. *Organization Science,* 14, 45-56.

Chiles, T. H., & McMackin, J. F. (1996). Integrating variable risk preferences, trust and transaction cost economics. *Academy of Management Review,* 21(1), 73-99.

Das, T. K., & Teng, B. (1998). Between trust and control: Developing confidence in partner cooperation in alliances. *Academy of Management Review,* 23(3), 491-512.

Dirks, K.T. (1999). The effects of interpersonal trust on work group performance. *Journal of Applied Psychology,* 84, 445-455.

Federal Acquisition Regulation Part 1.102.

Gunnerson, S., & Levitt, R. E. (1982). Is a building construction project a hierarchy or a market? *7th INTERNET Congress*.

Hanks, S. H., & Chandler, G. N. (1995). Patterns of formalization in emerging business ventures. Retrieved March 2005, from *Frontiers of Entrepreneurship Research* http://www.babson.edu/entrep/fer/papers95/hanks.html.

Hardin, R. (1971, September). Collective action as an agreeable n-prisoners' dilemma. *Behavioral Science*, 16, 472-481.

Hardin, R. (1998). Trust in government. In V. Braithwaite & M. Levi (Eds.), *Trust in Governance* (pp. 9-27). New York: Russell Sage Foundation.

Hardin, R. (2000). *Trust and trustworthiness*. New York: Russell Sage Foundation.

Hollingshead, A. (1996). Information suppression and status persistence in group decision making. *Human Communication Research,* 23(2), 193-219.

Kollock, P. (1994). The emergence of exchange structures: An experimental study of uncertainty, commitment, and trust. *American Journal of Sociology,* 100, 313-345.

Lane, C. (1998). Theories and issues in the study of trust. In C. Lane & R. Bachman (Eds.), *Trust within and between organizations. Conceptual issues and empirical applications* (pp. 1-30). New York: Oxford University Press

Leifer, R., & Mills, P. K. (1996). An information processing approach for deciding upon control strategies and reducing control loss in emerging organizations. *Journal of Management*, 22, 113-137.

Mayer, R.C., Davis, J.H. & Schoorman, D. (1995). An integrative model of organizational trust. *Academy of Management Review,* 20, 709-734.

McEvily, B., Perrone, V. & Zaheer, A. (2003). Trust as an organizing principle. *Organization Science,* 14, 91-103.

Nissen, Mark E. (1997). JSOW Alpha contracting case study (Software Version). Monterey, CA: Naval Postgraduate School.

Office of the Under Secretary of Defense (Acquisition and Technology). (August 1998). *DoD Integrated Product and Process Development Handbook.* 20301-3000. Washington, DC.

Ouchi, William G. (1979). A conceptual framework for the design or organizational control. *Management Science*, 25(9), 833-848.

Ouchi, W.G. (1980). Markets, bureaucracies, and clans. *Administrative Science Quarterly,* 25, 129-141.

Rousseau, D.M., Sitkin, S.B., Burt, R.S. & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review,* 23, 393-404.

Schneider, W. E. (2000). Why good management ideas fail: The neglected power of organizational culture. *Strategy & Leadership*, 28(1), 24.

Siemensen, T.I. (2002). Just contracting parties, or partners as well? *Acquisition Review Quarterly,* 9, 225-231.

Sitkin, S. B., & Roth, N. L. (1993). Explaining the limited effectiveness of legalistic “remedies” for trust/distrust. *Organization Science*, 4(3), 367-392.

Sitkin, S. B. & Stickel, D. (1996). The road to hell. The dynamics of distrust in an era of quality. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations* Thousand Oaks, CA: Sage Publications, Inc.

Williamson, O.E. (1979). Transaction cost economics: The governance of contractual relations. *Journal of Law and Economics,* 22, 233-261.

Zaheer, A. & Venkatraman, N. (1995). Relational governance as an interorganizational strategy: An empirical test of the role of trust in economic exchange. *Strategic Management Journal,* 16, 373-392.

Zolin, R., Hinds, P. J., (2004) Trust in Context: The development of interpersonal trust in geographically distributed work, In M. K. Roderick and K. Cook (Eds.), *Trust and Distrust in Organizations*. New York: Russell Sage Foundation.

Zolin R, Hinds P. J., Fruchter R., Levitt R. E. (2004). Interpersonal trust in cross-functional, geographically distributed work: A longitudinal study. *Information and Organization,* 14(1), 1-24.

THIS PAGE INTENTIONALLY LEFT BLANK

2003 - 2006 Sponsored Acquisition Research Topics

Acquisition Management

- Software Requirements for OA
- Managing Services Supply Chain
- Acquiring Combat Capability via Public-Private Partnerships (PPPs)
- Knowledge Value Added (KVA) + Real Options (RO) Applied to Shipyard Planning Processes
- Portfolio Optimization via KVA + RO
- MOSA Contracting Implications
- Strategy for Defense Acquisition Research
- Spiral Development
- BCA: Contractor vs. Organic Growth

Contract Management

- USAF IT Commodity Council
- Contractors in 21st Century Combat Zone
- Joint Contingency Contracting
- Navy Contract Writing Guide
- Commodity Sourcing Strategies
- Past Performance in Source Selection
- USMC Contingency Contracting
- Transforming DoD Contract Closeout
- Model for Optimizing Contingency Contracting Planning and Execution

Financial Management

- PPPs and Government Financing
- Energy Saving Contracts/DoD Mobile Assets
- Capital Budgeting for DoD
- Financing DoD Budget via PPPs
- ROI of Information Warfare Systems
- Acquisitions via leasing: MPS case
- Special Termination Liability in MDAPs

Logistics Management

- R-TOC Aegis Microwave Power Tubes

- Privatization-NOSL/NAWCI
- Army LOG MOD
- PBL (4)
- Contractors Supporting Military Operations
- RFID (4)
- Strategic Sourcing
- ASDS Product Support Analysis
- Analysis of LAV Depot Maintenance
- Diffusion/Variability on Vendor Performance Evaluation
- Optimizing CIWS Life Cycle Support (LCS)

Program Management

- Building Collaborative Capacity
- Knowledge, Responsibilities and Decision Rights in MDAPs
- KVA Applied to Aegis and SSDS
- Business Process Reengineering (BPR) for LCS Mission Module Acquisition
- Terminating Your Own Program
- Collaborative IT Tools Leveraging Competence

A complete listing and electronic copies of published research within the Acquisition Research Program are available on our website: www.acquisitionresearch.org

ACQUISITION RESEARCH PROGRAM
GRADUATE SCHOOL OF BUSINESS & PUBLIC POLICY
NAVAL POSTGRADUATE SCHOOL
555 DYER ROAD, INGERSOLL HALL
MONTEREY, CALIFORNIA 93943

www.acquisitionresearch.org